U.S. Fire Administration

Topical Fire Research Series

November 2001
Revised March 2002

Vol. 2, Issue 14

Construction Site Fires

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United States Fire Administration
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Emmitsburg, Maryland 21727

FINDINGS

- Each year, an estimated 4,800 construction site fires cause $35 million in property loss.
- Firefighters injured in construction fires are twice as likely to be hit or struck by debris and other objects than firefighters at other fire sites.
- Fire incidence at construction sites/complexes increases as the workday progresses.
- The causes of 71% of construction site fires are arson and open flame.

Sources: NFPA and NFIRS

Each year between 1996 and 1998, an estimated 4,800 fires were reported at construction sites or complexes. These fires are responsible for approximately 30 injuries, 10 fatalities, and $35.2 million in property loss.[1] This report addresses the causes and characteristics of these fires.

Figure 1 compares the loss measures for construction site fires to those for all reported fires. Construction site fires are less likely to injure or kill civilians, but cause more damage than fires generally, possibly because they tend to have little protection from fire (e.g., smoke alarms, sprinklers). The dollar loss per fire does not include costs incurred as a result of construction delays caused by fire damage.

Firefighters at construction site fires, however, face a high rate of injury—14% of all firefighter injuries over the 3-year period.[2] No firefighter casualties were reported to the National Fire Incident Reporting System (NFIRS) between 1996 and 1998.

As shown in Figure 1, firefighters are more likely to be injured on construction sites than in fires generally. Figure 2 compares the

Figure 1. Loss Measures for Construction Site Fires
(3-year average, NFIRS data 1996–98)

LOSS MEASURE	ALL REPORTED FIRES	CONSTRUCTION SITE FIRES
Dollar Loss/Fire	$5,619	$8,643
Civilian Injuries/1,000 Fires	15.7	7.5
Civilian Fatalities/1,000 Fires	2.4	2.3
Firefighter Injuries/1,000 Fires	11.0	13.4

Source: NFIRS only

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causes of firefighter casualties on construction sites to firefighter casualties generally. Firefighters injured on construction sites are more likely to fall or slip or to be struck by an object such as debris or other construction materials.

Property Types

Figure 3 lists the leading property uses associated with construction complex fires. The leading property use is vacant construction properties. A small percentage of fires do occur on residential, commercial, and educational properties where construction projects are underway. Also, less than 1% of construction complex fires involve buildings slated for demolition.

Figure 3. Leading Fixed Property Uses

(3-year average, NFIRS data 1996–98, adjusted percentage)

FIXED PROPERTY USE	PERCENT OF FIRES
Vacant Construction Property	12
Building Under Construction	11
Construction Site	9

Source: NFIRS only

Figure 2. Causes of Firefighter Casualties: Construction Sites vs. All Sites

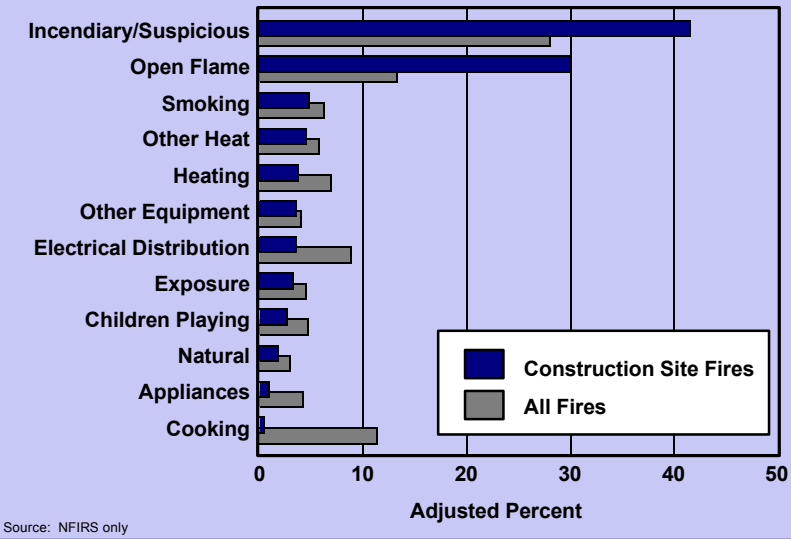
(3-year average, NFIRS data 1996–98, adjusted percentage)

CAUSE	ALL CASUALTIES	FIREFIGHTER CASUALTIES
Fell/Slipped	20	27
Caught/Trapped	5	5
Struck by	16	30
Contact with/Exposure to	34	17
Overexertion	23	22

Source: NFIRS only

Figure 4. Causes of Construction Site Fires

(3-year average, NFIRS data 1996–98)



Source: NFIRS only

Causes

Figure 4 illustrates the leading causes of construction site fires. The two dominant causes are incendiary/suspicious (arson) (41%) and open flame (30%). Arson fires are one and one-half times more frequent than all reported fires.

Sources of Ignition

The leading sources of heat of ignition at construction sites are listed in Figure 5. The open fire category includes rubbish fires, open incinerators, and open trash burners. The combination of open fire and cutting torch sources of ignition (18%) correspond to the high incidence of open flame fires.

Figure 6 highlights the leading factors influencing the ignition of construction site fires. The prominence of incendiary/suspicious fires is not surprising. For the remainder of fires, about 30% involve the misuse of the heat of ignition (e.g., cutting/welding too close to combustibles). This underscores the importance of properly discarding ignition sources and using tools in an appropriate manner.

Figure 5. Sources of Heat of Ignition

(3-year average, NFIRS data 1996–98, adjusted percentage)

HEAT OF IGNITION	PERCENT OF FIRES
Matches	18
Cutting Torch	9
Open Fire	9
Cigarette	5

Source: NFIRS only

Figure 6. Factors Influencing Fire Ignition

(3-year average, NFIRS data 1996–98, adjusted percentage)

IGNITION FACTOR	PERCENT OF FIRES
Incendiary/Suspicious	39
Cutting/Welding Too Close to Combustibles	11
Abandoned, Discarded Materials	9
Inadequate Control of Open Fire	6

Source: NFIRS only

Materials Ignited

The leading materials ignited in construction site fires are rubbish/trash; growing/living forms, including grass, trees, and brush; and structural members/framing materials. Consistent with the predominance of arson fires, fuel—particularly gasoline—is also a common material ignited in fires on construction sites.

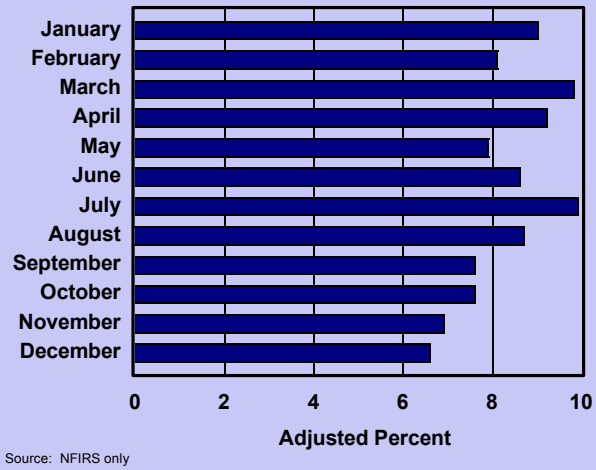
When Fires Occur

Construction site fires are spread somewhat uniformly throughout the year (Figure 7). March and July are peak months.

As shown in Figure 8, fire incidence at construction sites increases steadily over the course of the workday (0600–1800). The pattern for arson fires at these sites, however, is the opposite, with fire incidence more prevalent after hours. (This is consistent with national arson trends generally.)

Figure 7. Incidence of Construction Site Fires by Month

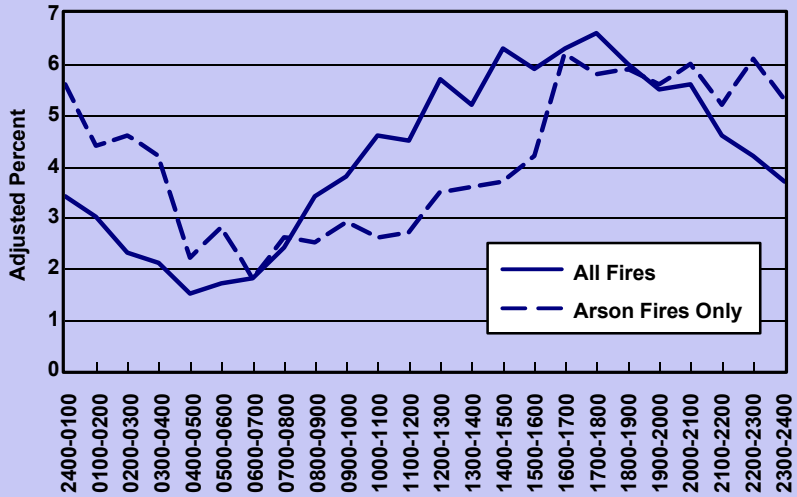
(3-year average, NFIRS data 1996–98)



Source: NFIRS only

Figure 8. Incidence of Construction Site Fires by Time of Day

(3-year average, NFIRS data 1996–98)



Source: NFIRS only

Examples

- In October 2000, a suspicious four-alarm fire destroyed a live-work loft project under construction in California.[3]

- In May 2000, an accidental six-alarm fire destroyed a luxury apartment complex under construction and heavily damaged a historic post office in Tampa, Florida. The fire ignited when a forklift hit a utility pole and knocked down a transformer, which fell onto combustible construction debris.[4]

- In June 2000, workers using a cutting torch ignited a fire that affected 32,000 phone lines in the San Francisco area.[5]

- In June 1999, a crane operator was trapped above a fire at a historical renovation project in Atlanta, Georgia. The fire department used a helicopter to rescue him.[6]

Conclusion

As with all fires, construction site fires are largely preventable. For further information, contact your local fire department or the USFA.

To review the detailed methodology used in this analysis, click **METHODOLOGY**

Notes:

1. National estimates are based on data from the National Fire Incident Reporting System (NFIRS) (1996-1998) and the National Fire Protection Association's (NFPA's) annual survey, *Fire Loss in the United States.*
2. *Fire in the United States, Twelfth Edition,* U.S. Fire Administration, August 2001.
3. Reang, Putsata, "Neighbors Worry About Fire at Construction Site," *Mercury News,* October 18, 2000.
4. Chachere, Vickie, "Fire Hits Construction Site in Tampa's Ybor City," The Associated Press, May 19, 2000.
5. Stannard, Matthew, "Third Fiasco in Three Months at BART Site," *The San Francisco Chronicle,* September 13, 2000.
6. Rhodes, David, "Atlanta Mill Fire and Helicopter Rescue," *Fire Engineering,* June 1999.